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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/876,522	06/07/2001	Charles Cohn	COHN 9	9236

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EXAMINER	
MUTSCHLER, BRIAN L	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 10/23/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/876,522	COHN, CHARLES	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- Th MAILING DATE of this communication app ars on th cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-11,14 and 21-24* is/are rejected.

7)☒ Claim(s) *5,6,12 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Comments

1. The objection to claim 1 has been overcome by Applicant's amendment.

2. The rejection of claims 1-14 and 21-24 under 35 U.S.C. § 112, 1st paragraph, has been overcome by Applicant's amendment to the claims to correct the terminology.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 7-11, 14 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama (U.S. Pat. No. 6,254,758) in view of Stern (U.S. Pat. No. 6,015,482).

Regarding claims 1 and 8, Koyama discloses a method for plating patterns on wiring boards, including multi-layer wiring boards, wherein the method comprises the following steps:

a) Forming an interconnect **20a** on opposing sides of a wiring board **24** and through a via formed through the wiring board **24** (fig. 5(a)).

b) Forming first and second dielectric layers **10** over the first and second sides of the wiring board **24**, wherein the dielectric layers **10** comprise

openings **26** that expose portions of the underlying interconnect **20a** (figs. 4 and 5(b)).

c) Forming first and second plating layers on the first and second dielectric layers, respectively, and on the sides of the openings and on the exposed portions of the metal interconnect **20a** (fig. 5(c)). The step of forming a plating layer is a part of the method for forming conductor patterns **20a** and **20b** (see col. 6, lines 54-60), wherein the process of forming the conductor patterns, as shown in Figure 1 comprises:

i) Forming an electroless plated copper layer (plating layer) **12** on the surface of the insulating layer **10**. As shown in Figure 1, the electroless plated copper layer **12** is a continuous layer. When used for fabricated the conductor patterns **20a** in the method shown in Figures 5(a) to 55(e), the electroless layer would also plate on the exposed portions of the underlying conductor patterns (interconnect) **20a**.

ii) Forming a resist **14**.

iii) Electroplating a copper layer **16**.

iv) Annealing.

v) Etching the electroless plated copper layer **12** in areas not covered by the electroplated copper layers **16** to form conductor patterns **20** (col. 2, lines 25-37).

Regarding claims 2 and 9, the plating layers **12** are formed by electroless plating and the conductive layers **16** are formed by electroplating (col. 3, lines 31-50).

Regarding claims 7 and 14, the removal (etching) of portions of the electroless plated layers (plating layers) **12** occurs after electroplating has been carried out (fig. 1; col. 2, lines 25-37).

Regarding claims 21 and 23, since the openings **26** in the dielectric layers **10** are not formed above the vias, the plating layers **12** formed on the dielectric layers **10** are not formed in the vias (fig. 5(b)).

Regarding claims 22 and 24, the formation of conductor patterns **20a**, which corresponds to the electroplating of copper layers **16**, is confined substantially to the openings **26** of the dielectric layers **10** (figs. 4 and 5(e)).

The method disclosed by Koyama differs from the instant invention because Koyama does not teach the following:

a. Forming first and second contact layers over portions of the plating layers using the plating layers, as recited in claims 1 and 8;

b. Electroplating first and second contact layers includes electroplating first and second barrier layers over the plating layers, as recited in claims 3 and 10;

c. Electroplating the barrier layers includes electroplating first and second nickel layers and further electroplating first and second gold layers on the first and second nickel layers, as recited in claims 4 and 11;

Stern discloses a method for fabricating contacts or surface mount pads on printed circuits wherein contacts are formed on copper patterns. The contacts are formed by electroplating nickel on a copper pattern, followed by electroplating gold on the nickel (col. 3, lines 8-21). Stern teaches, "Electroplating of nickel is required to prevent 'migration' of copper into the electroplated gold...[because] copper reduces the anti-corrosive properties of gold, which is essential to the integrity of printed circuit contacts, requiring exposed conductive leads" (col. 3, lines 12-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Koyama to form gold contacts on the plating layers as taught by Stern because gold contacts are anti-corrosive, which Stern teaches "is essential to the integrity of printed circuit boards, requiring exposed conductive leads" (col. 3, lines 17-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Koyama to include a step of fabricating a barrier layer made of nickel as taught by Stern because the electroplating of nickel prevents the migration of copper into gold contacts and protects the anticorrosive properties of gold.

Allowable Subject Matter

5. Claims 5, 6, 12 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: The method of Koyama requires the formation of a patterned resist **14**, which is removed after the step of electroplating has occurred. Modifying the method of Koyama to remove the plating layer prior to electroplating or by forming a discontinuous plating layer would render the process inoperable because a continuous plating layer and a resist are required in the method of Koyama to provide an electrical path for the electrolytic plating of the copper layers **16**. The instant method would therefore limit the amount of the plating layer to be removed, which could help prevent damage to the electroplated layers.

Response to Arguments

7. Applicant's arguments filed September 30, 2003, have been fully considered but they are not persuasive.

8. Regarding the rejection of claims 1-4, 7-11, 14 and 21-24 over Koyama and Stern, Applicant has argued, "Koyama only teaches the general notion of etching an electroless copper plated layer 12 exposed by using a special etching solution" and fails to teach the removal of a portion of the plating layers while leaving portions of the plating layers under the conductive patterns (see page 9 of Applicant's response).

9. This argument is not persuasive because Koyama clearly teaches "removing the exposed electroless copper plated layer" (col. 2, lines 34-35). The exposed electroless copper plated layer is the portion of the electroless copper plated layer exposed by removing the patterned resist. The unexposed electroless copper plated layer is the

portion which was not covered by the patterned resist, which was covered by the electrolytic copper plated layer. Therefore, since only the exposed electrolytic copper plated layer is removed in the method of Koyama, the method of Koyama teaches the step of removing portions of the plating layer while leaving portions of the plating layer under the contact patterns.

10. Applicant further argues the combination of the Koyama and Stern references on the grounds that "Koyama has no reason or motive to form gold contacts on copper" (see page 10 of Applicant's response).

11. This argument is not persuasive because Stern provides the motivation for forming gold contacts on copper. Copper readily oxidizes in air, increasing the resistance of the copper. Stern teaches that gold and nickel layers electroplated on copper are "essential to the integrity of printed circuit contacts, requiring exposed conductive leads" (col. 3, lines 8-21). Therefore, it would have been obvious to one having ordinary skill in the art to plate nickel and gold layers over the copper to preserve the integrity of the printed circuit contacts.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm. When the Office moves to the new campus, the examiner can be reached at (571) 272-1341.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

blm
October 17, 2003